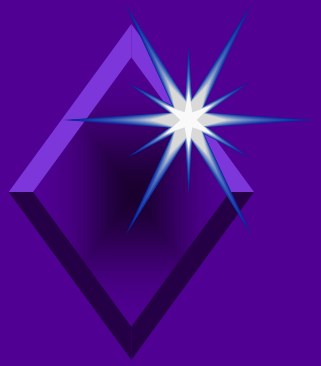


Buy your lab coat and gloves!

Chapter 9
Joints = Articulations

Where ANY bones come together

Developed by
John Gallagher, MS, DVM

LAS POSITAS COLLEGE

Classification of Joints

1. Function
    1. Based on ROM
2. Structure
    1. Based on structure and whether there is a joint cavity

1. Functional Classification of Joints

1) **Synarthrosis** (no movement)
- Fibrous (Sutural or Gomphosis)
- Cartilaginous (Synchondrosis often becomes synostosis)
- Bony Fusion (Synostosis)

2) **Amphiarthrosis** (little movement)
- Fibrous (Syndesmosis – tibia to fibula)
- Cartilaginous (Symphysis)

3) **Diarthrosis** (free movement)

Three types of movement
Six Types of structure

2. Structural Classification of Joints (*Marieb utilizes Structural Classification (See Table 9.1)*

- *1. Fibrous (no joint cavity)*
  - *Almost no movement, little CT*
  - *E.g, Sutures in calvarium*
- *2. Cartilaginous*
  - *E.g., Symphysis pubis, IV disks*
- *3. Synovial – by far most important*

1. Fibrous (no joint cavity)

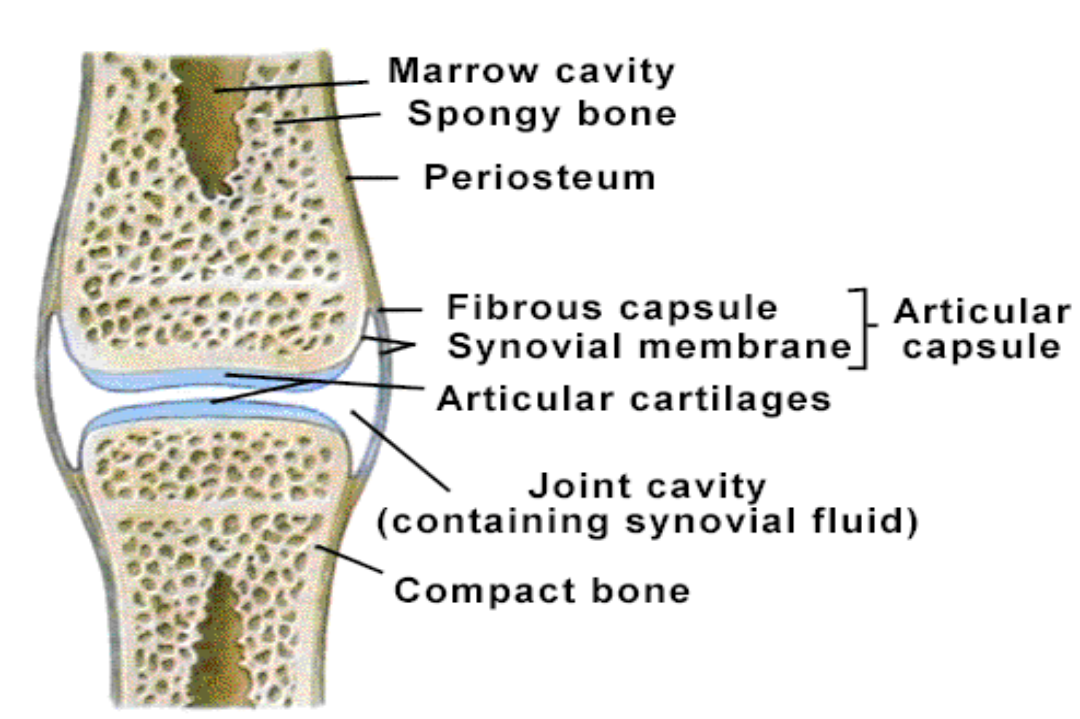
- Sutures
  - Only in the skull
    - Lambdoidal, Coronal, etc.
    - Minimal movement
    - Growth allowed
- Syndesmosis (pl. syndesmoses)
  - Ligamentous attachments
  - Minimal movement
  - E.g., distal tibia to distal fibula
- Gomphosis (pl. gomphoses)
  - Teeth
  - Periodontal ligament

2. Cartilaginous = *Union by cartilage*

- Synchondrosis
  - Epiphyseal plates
  - May become synostosis
- Symphysis
  - Fibrocartilage
  - Intervertebral Disks, symphysis pubis

3. Synovial (with egg white) – most important!

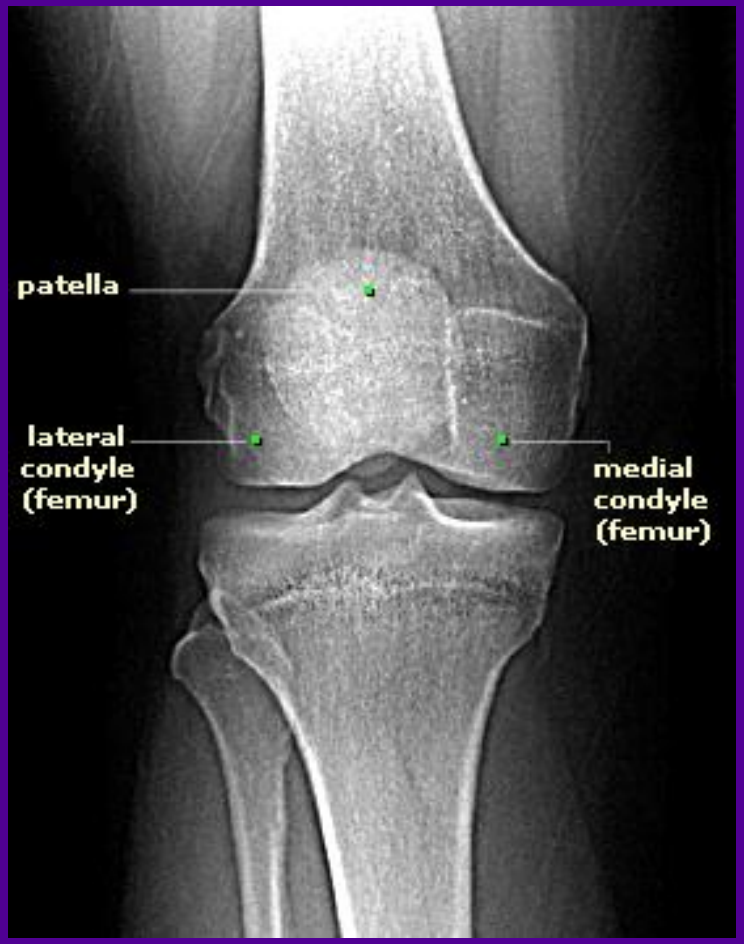
1. Articular Cartilage
    1. Hyaline
2. Joint Cavity or Space
3. Synovial Membrane
    1. Synovial Fluid
        1. **Nourishes**
        2. **Cushions**
        3. **Lubricates**
4. Joint Capsule
5. Reinforcing Ligaments
6. Nerves and blood supply



3. Synovial, cont'd

Joint Stability

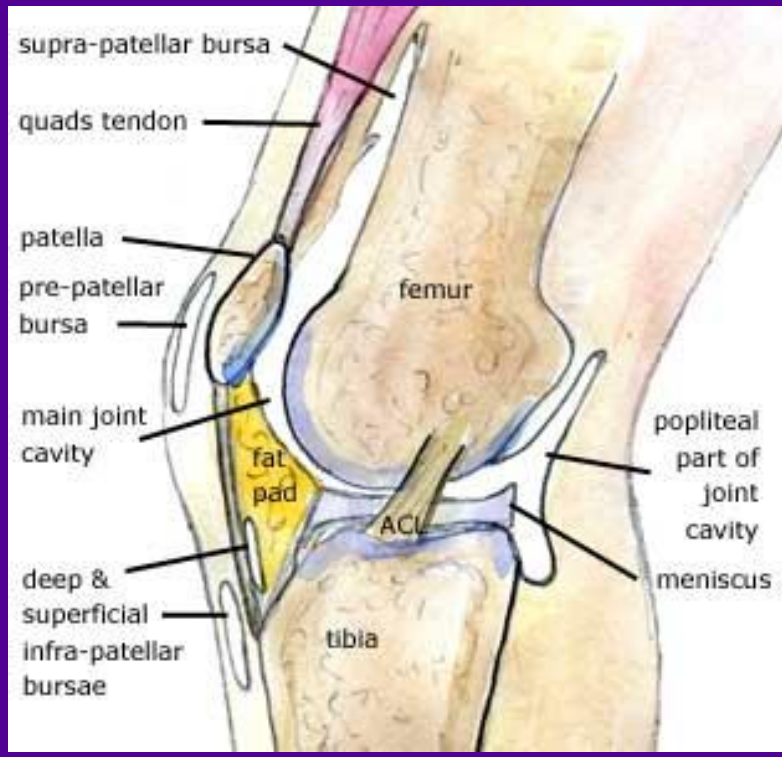
- Depends on:
  - Shape of articular surfaces
  - Supporting Ligaments
  - Muscle Tone



Bursae and Tendon Sheaths

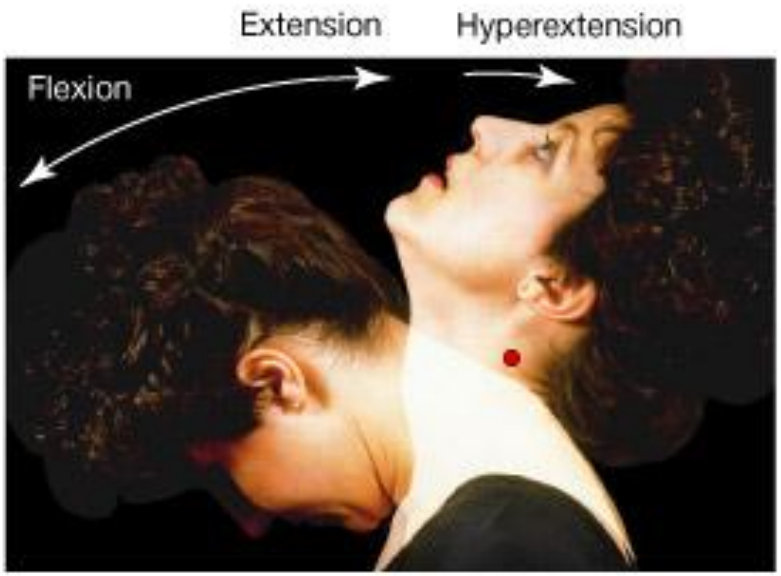
- Bags of synovial fluid
- Lubrication and cushion
  - Tendons
  - Ligaments

n.b.: Tendinitis, Synovitis



Three Types of Motion at Synovial Joints

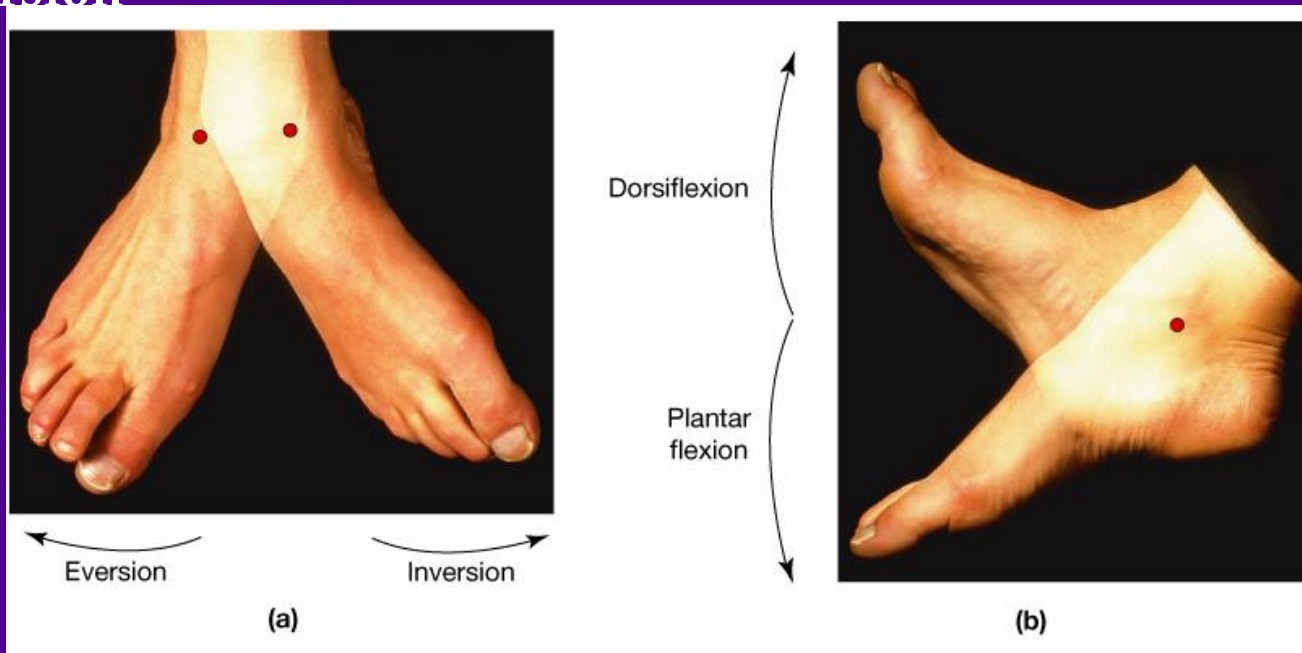
- **Linear motion** = gliding
- **Angular motion :**
  - flexion, extension, hyperextension
  - ab-, adduction
  - circumduction
- **Rotation**
  - left - right, internal or medial, external or lateral
  - C_1 – C_2 , leg/foot, radius



Special Movements

Table 9.4

- Supination, Pronation
  - **Radius/ulna**
- **Dorsiflexion, plantar flexion**
- **Elevation, depression**
- **Eversion, Inversion**



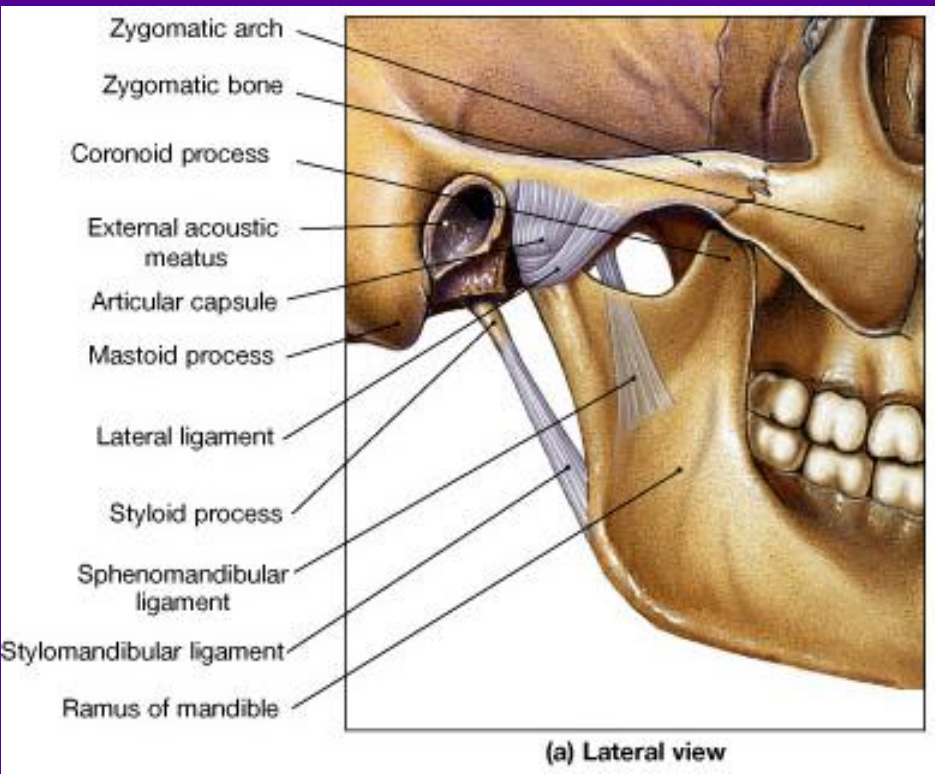
6 types of Synovial Joints

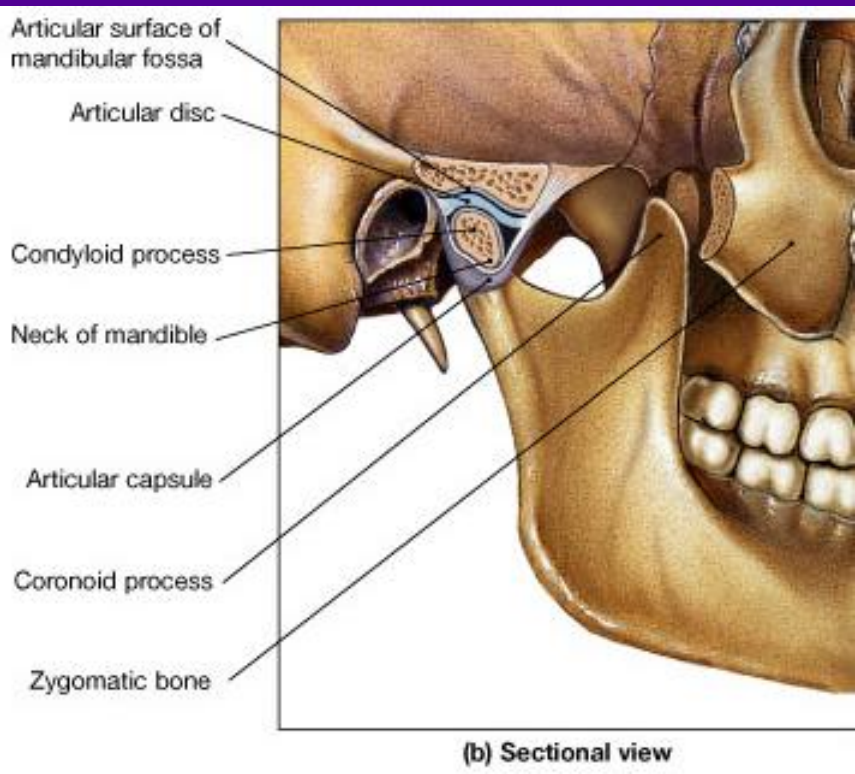
1. **Plane (Gliding) Joint**
2. **Hinge Joint**
3. **Pivot Joint**
4. **Condyloid (Ellipsoidal) Joint**
5. **Saddle joint**
6. **Ball & Socket joint**

See (p 216, fig 9.8)

Representative Articulations

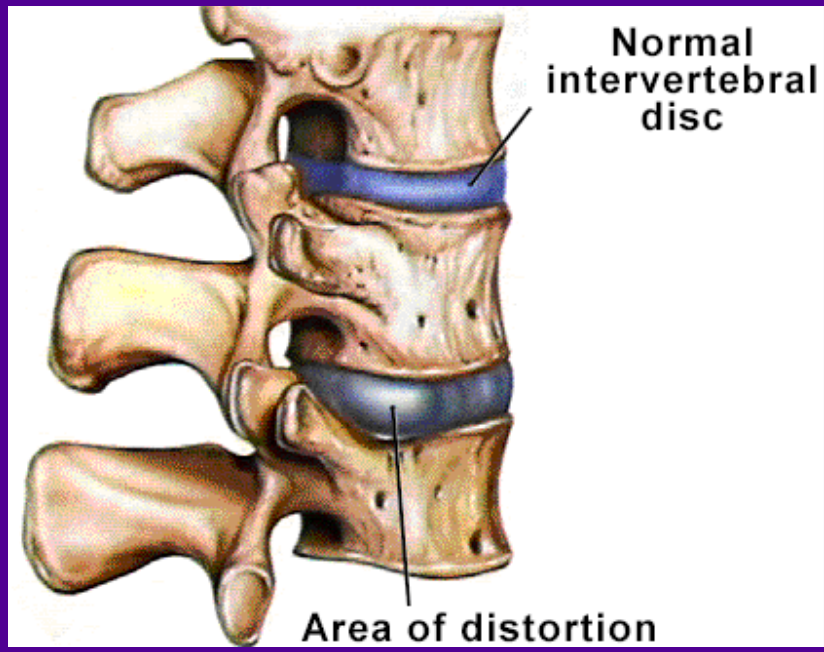
- **Temporomandibular Joint**
  - Mostly hinge joint, some gliding and rotation
  - Articular disc





Intervertebral articulations

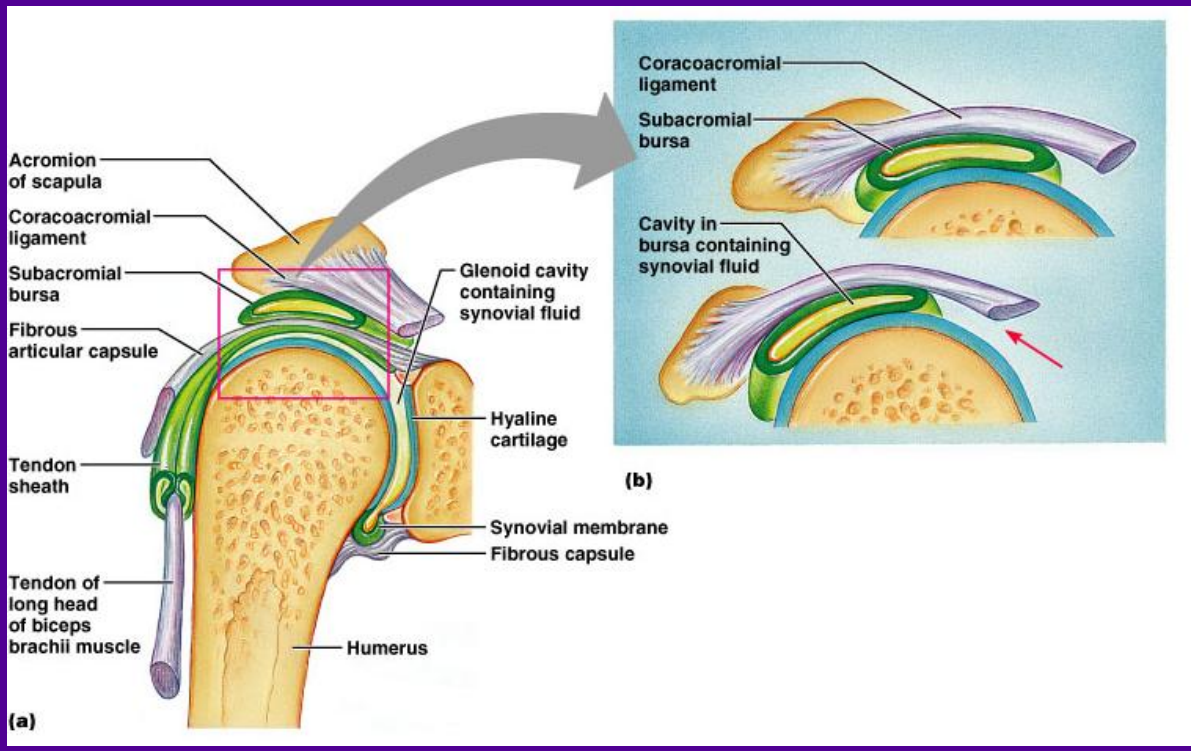
- **Gliding joints** between vertebrae
  - Articular facets (synovial joints
- **Intervertebral discs:** (Amphiarthroses)
  - **annulus fibrosus:** tough outer layer (fibrocartilage)
  - **nucleus pulposus:** soft, gelatinous core
  - Account for ~25% of vertebral column height – H_2O loss during aging



Glenohumeral (shoulder) Joint

Greatest range of motion (due to loose capsule and shallow glenoid)

- Most frequently dislocated
- Stability provided by rotator cuff

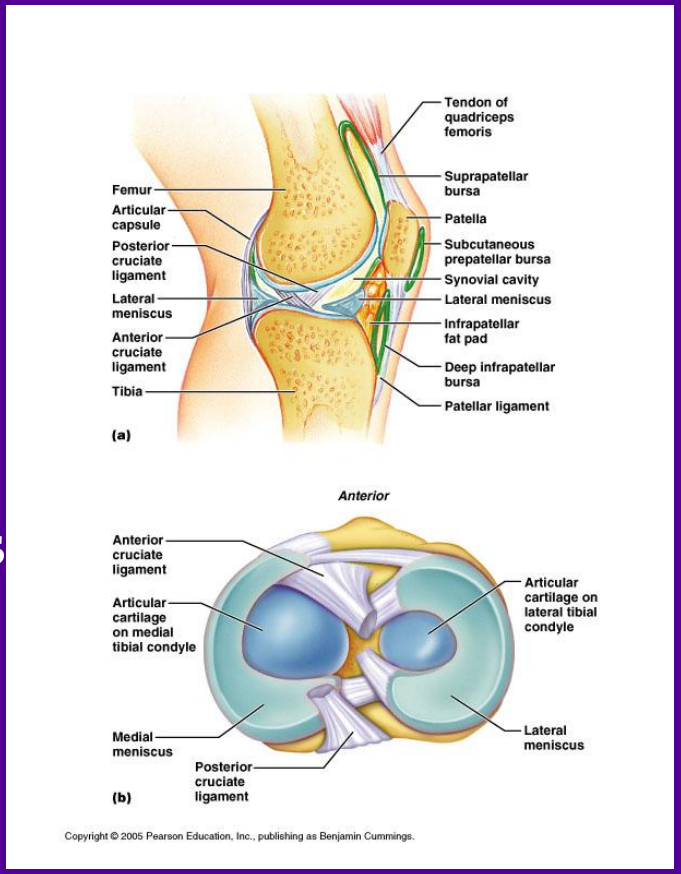


Hip (coxofemoral joint)

- Deep well fitted ball and socket joint
- Stabilization:
  - Extracapsular and intracapsular ligaments (ligamentum teres = ligamentum capitis femoris)
  - Strong joint capsule
  - Extensive surrounding musculature

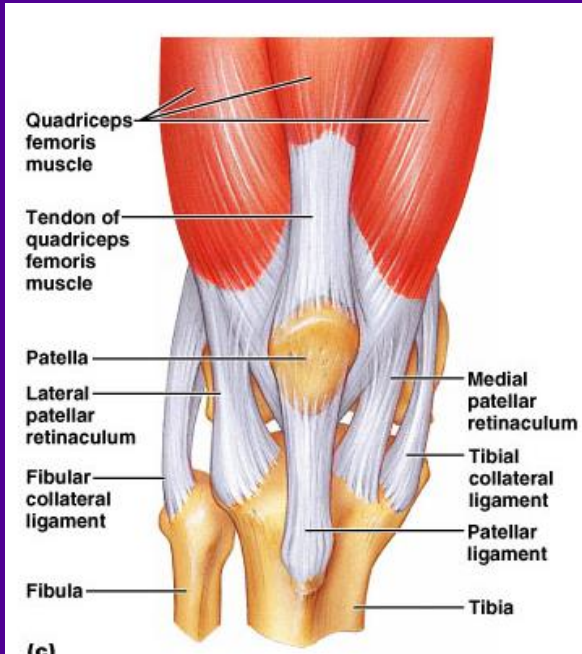
Knee

- Much more complex than elbow
- Less stable than other hinge joints
  - Some gliding and rotation
- Structurally 3 separate joints
- No single joint capsule

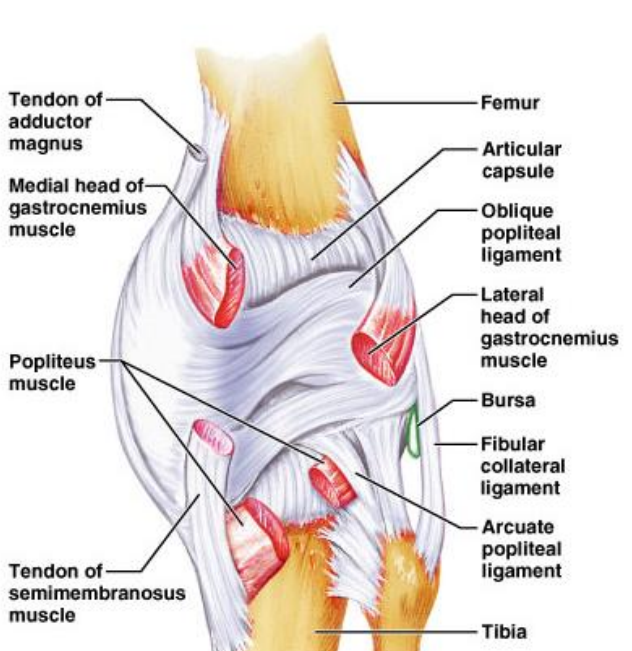


More Knee

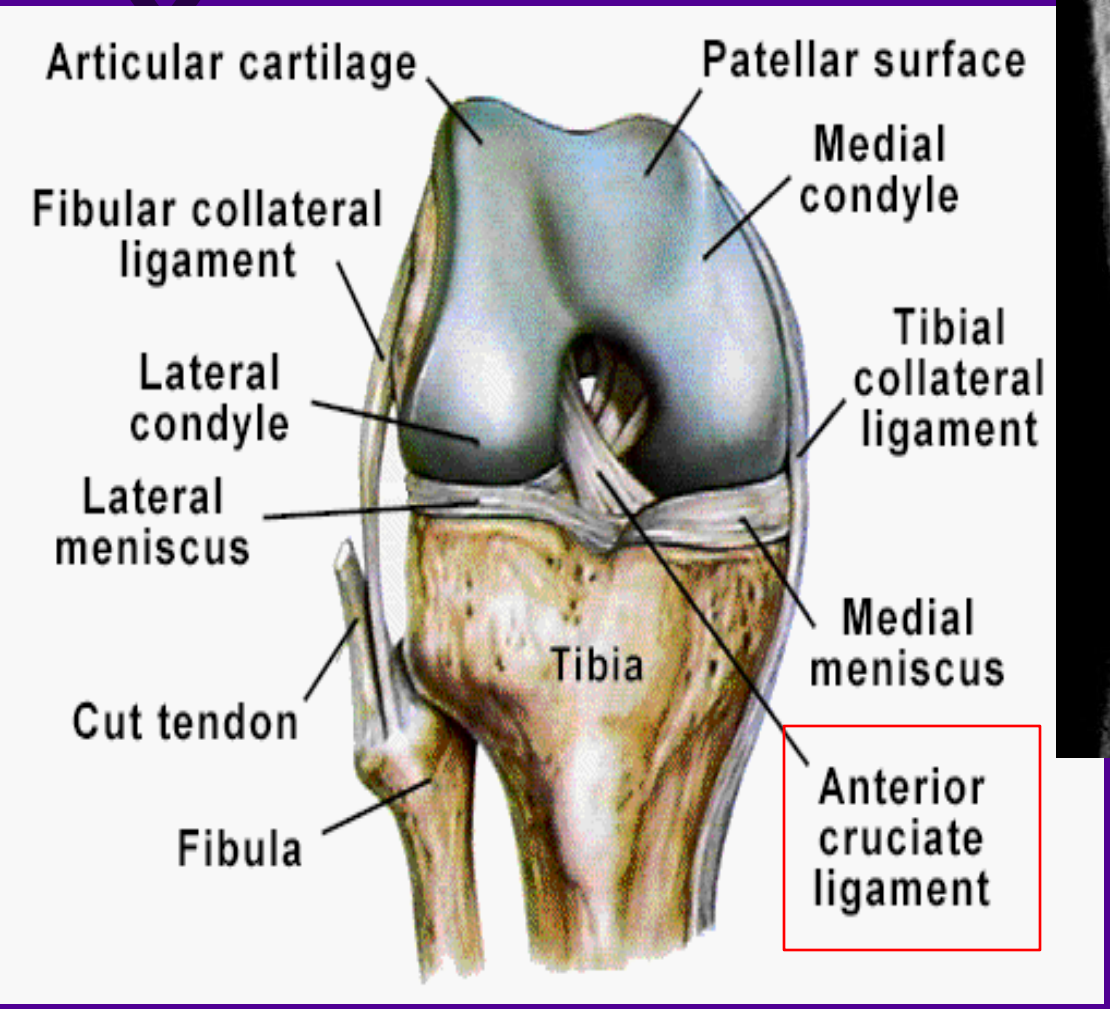
- Extra- and intracapsular structures
  - Medial and lateral meniscus
  - Cruciate ligaments
  - Collateral ligaments (extracapsular)
  - Fat Pads
  - Patella and Patellar Tendon/ligament

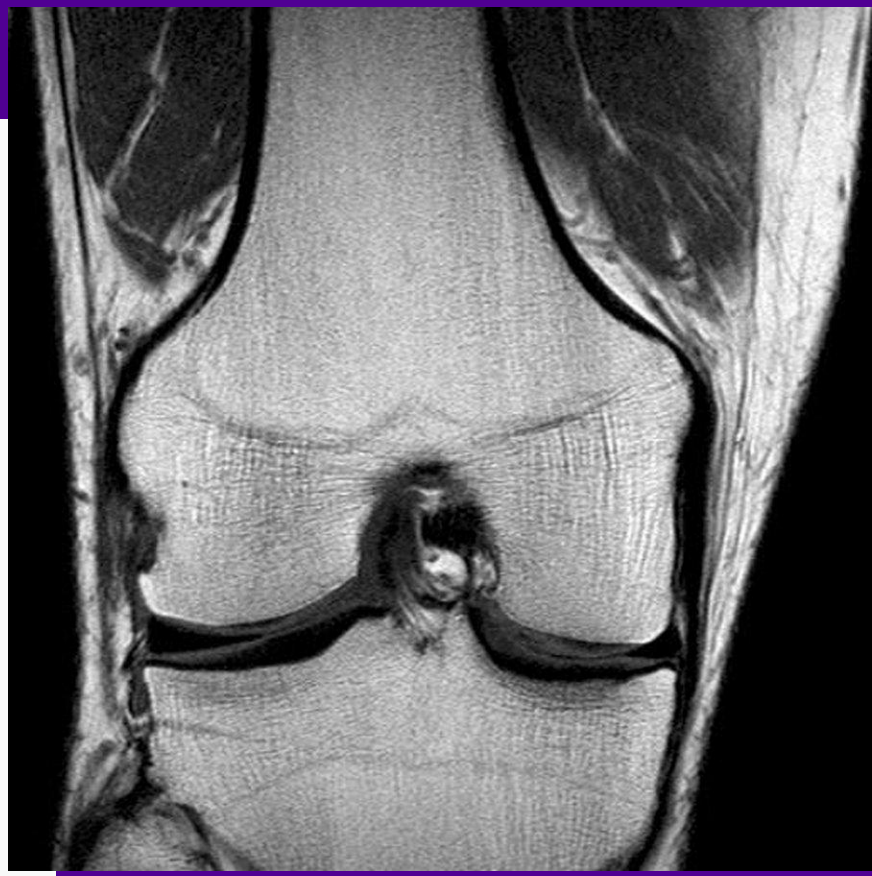


Anterior

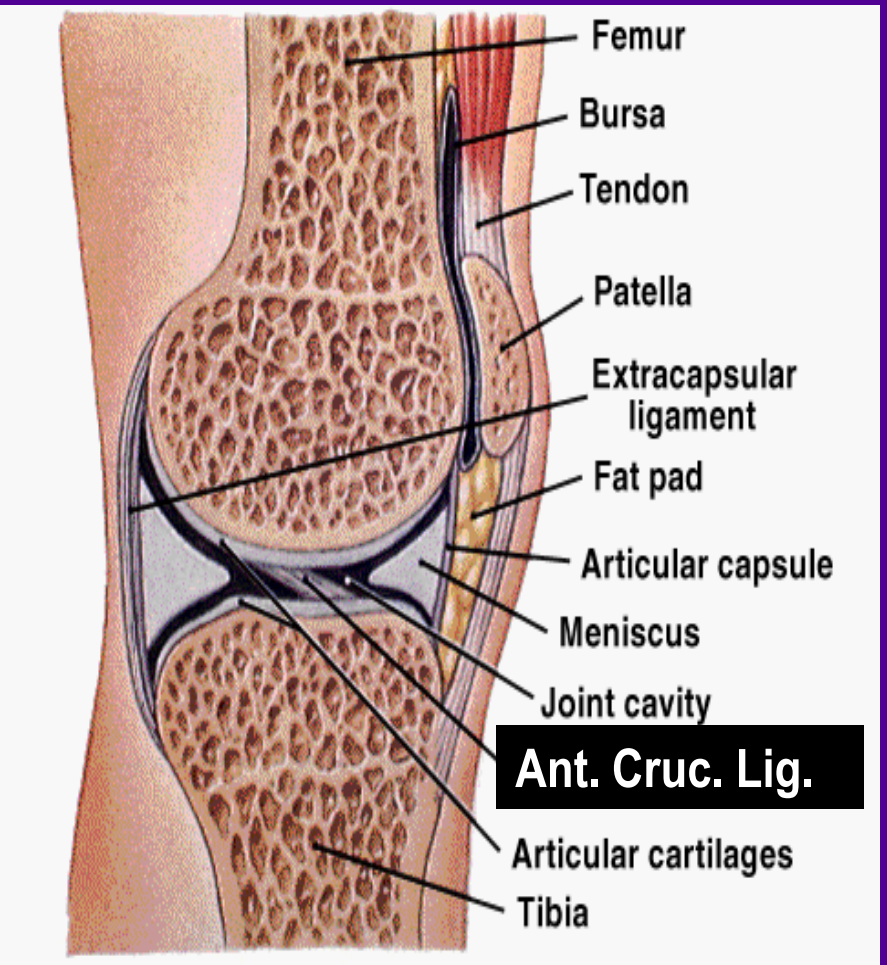


Posterior


Articular cartilage
Patellar surface
Medial condyle
Fibular collateral ligament
Tibial collateral ligament
Lateral condyle
Lateral meniscus
Medial meniscus
Tibia
Cut tendon
Anterior cruciate ligament
Fibula

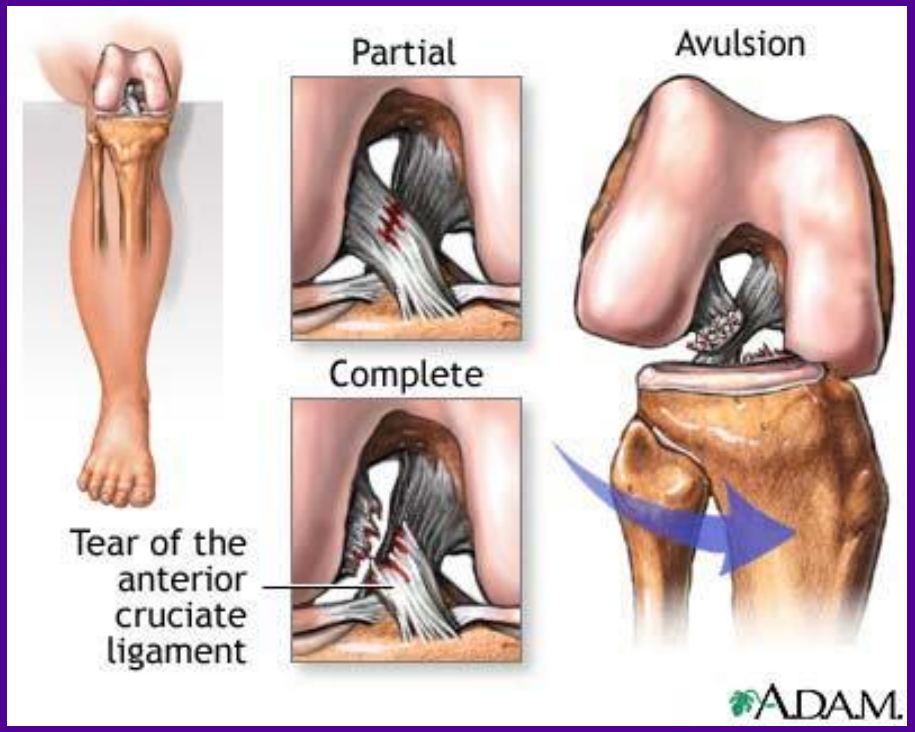


Knee, sagittal section

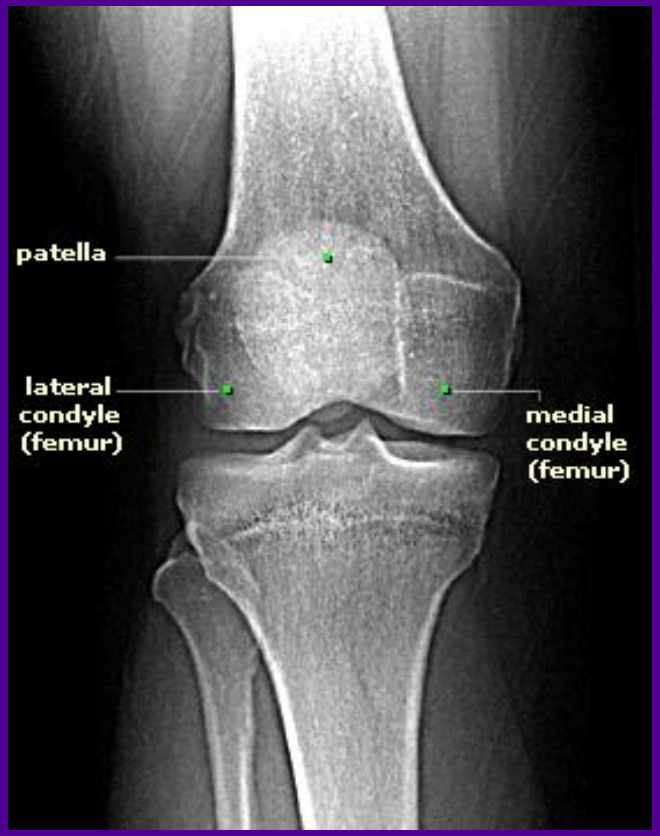


The infamous ACL

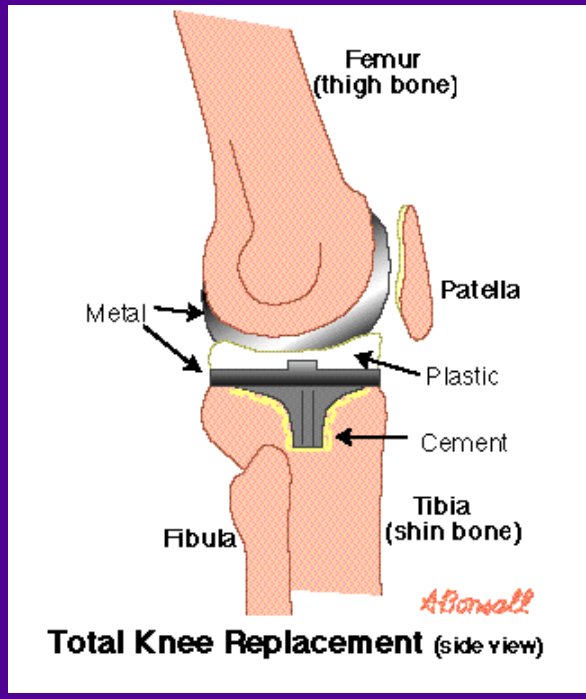
- Twisting
  - Soccer, skiing, etc.
- 8X more common in women
  - Hormones
  - Strength
  - Geometry
- Surgery is optional
  - Several techniques
- Post-op period



Total Knee Replacement

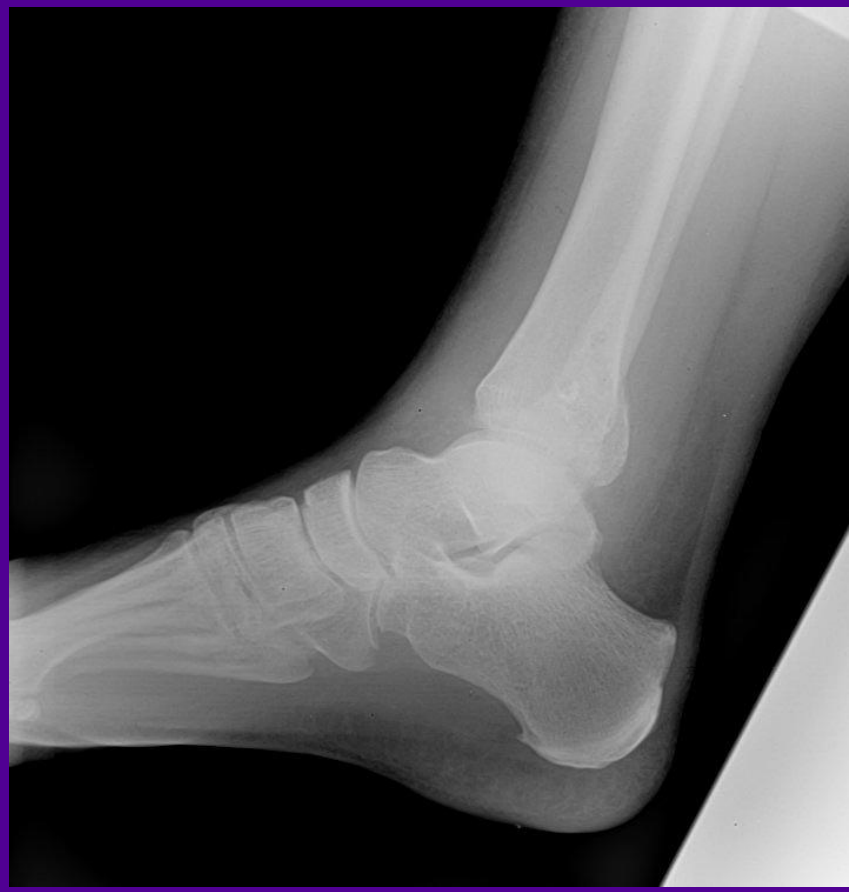


Total Knee Replacement



The Ankle and Foot

- Hinge Joint
  - Deltoid and three Lateral Ligaments
- Calcaneous = Heel Bone
  - Calcaneal/Achilles Tendon
- Talus articulates with tibia
- Intertarsal and Tarsometatarsal Joints
- Cunieform bones
- Metarsal and phalangeal bones
  - Similar to the hand



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San Ramon Regional Medical Center
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